

## SEQUENCE LISTING

<110> University of Pennsylvania  
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Rubin, Harvey  
Avarbock, Andrew

<120> Fragments and Activity of Rel protein in M. Tuberculosis and other  
uses thereof

<130> UPFT0002-500

<150> US 60/420,129

<151> 2002-10-22

<160> 20

<170> PatentIn version 3.2

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<212> DNA

<213> Mycobacterium tuberculosis

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<211> 34

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<213> Mycobacterium tuberculosis

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<213> Mycobacterium tuberculosis

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<211> 35

<212> DNA

<213> Mycobacterium tuberculosis

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<211> 36

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<213> Mycobacterium tuberculosis

<400> 5

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<213> Mycobacterium tuberculosis

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36

<210> 7  
<211> 738  
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<400> 7

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Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
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Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu  
85 90 95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu Pro Pro Glu Lys  
145 150 155 160

Gln Ala Arg Lys Ala Arg Glu Thr Leu Glu Val Ile Ala Pro Leu Ala  
165 170 175

His Arg Leu Gly Met Ala Ser Val Lys Trp Glu Leu Glu Asp Leu Ser  
180 185 190

Phe Ala Ile Leu His Pro Lys Lys Tyr Glu Glu Ile Val Arg Leu Val  
195 200 205

Ala Gly Arg Ala Pro Ser Arg Asp Thr Tyr Leu Ala Lys Val Arg Ala  
210 215 220

Glu Ile Val Asn Thr Leu Thr Ala Ser Lys Ile Lys Ala Thr Val Glu  
225 230 235 240

Gly Arg Pro Lys His Tyr Trp Ser Ile Tyr Gln Lys Met Ile Val Lys  
245 250 255

Gly Arg Asp Phe Asp Asp Ile His Asp Leu Val Gly Val Arg Ile Leu  
260 265 270

Cys Asp Glu Ile Arg Asp Cys Tyr Ala Ala Val Gly Val Val His Ser  
275 280 285

Leu Trp Gln Pro Met Ala Gly Arg Phe Lys Asp Tyr Ile Ala Gln Pro  
290 295 300

Arg Tyr Gly Val Tyr Gln Ser Leu His Thr Thr Val Val Gly Pro Glu  
305 310 315 320

Gly Lys Pro Leu Glu Val Gln Ile Arg Thr Arg Asp Met His Arg Thr  
325 330 335

Ala Glu Tyr Gly Ile Ala Ala His Trp Arg Tyr Lys Glu Ala Lys Gly  
340 345 350

Arg Asn Gly Val Leu His Pro His Ala Ala Ala Glu Ile Asp Asp Met  
355 360 365

Ala Trp Met Arg Gln Leu Leu Asp Trp Gln Arg Glu Ala Ala Asp Pro  
370 375 380

Gly Glu Phe Leu Glu Ser Leu Arg Tyr Asp Leu Ala Val Gln Glu Ile  
385 390 395 400

Phe Val Phe Thr Pro Lys Gly Asp Val Ile Thr Leu Pro Thr Gly Ser  
405 410 415

Thr Pro Val Asp Phe Ala Tyr Ala Val His Thr Glu Val Gly His Arg  
420 425 430

Cys Ile Gly Ala Arg Val Asn Gly Arg Leu Val Ala Leu Glu Arg Lys  
435 440 445

Leu Glu Asn Gly Glu Val Val Glu Val Phe Thr Ser Lys Ala Pro Asn  
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Ala Gly Pro Ser Arg Asp Trp Gln Gln Phe Val Val Ser Pro Arg Ala  
465 470 475 480

Lys Thr Lys Ile Arg Gln Trp Phe Ala Lys Glu Arg Arg Glu Glu Ala  
485 490 495

Leu Glu Thr Gly Lys Asp Ala Met Ala Arg Glu Val Arg Arg Gly Gly  
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Leu Pro Leu Gln Arg Leu Val Asn Gly Glu Ser Met Ala Ala Val Ala  
515 520 525

Arg Glu Leu His Tyr Ala Asp Val Ser Ala Leu Tyr Thr Ala Ile Gly  
530 535 540

Glu Gly His Val Ser Ala Lys His Val Val Gln Arg Leu Leu Ala Glu  
545 550 555 560

Leu Gly Gly Ile Asp Gln Ala Glu Glu Glu Leu Ala Glu Arg Ser Thr  
565 570 575

Pro Ala Thr Met Pro Arg Arg Pro Arg Ser Thr Asp Asp Val Gly Val  
580 585 590

Ser Val Pro Gly Ala Pro Gly Val Leu Thr Lys Leu Ala Lys Cys Cys  
595 600 605

Thr Pro Val Pro Gly Asp Val Ile Met Gly Phe Val Thr Arg Gly Gly  
610 615 620

Gly Val Ser Val His Arg Thr Asp Cys Thr Asn Ala Ala Ser Leu Gln  
625 630 635 640

Gln Gln Ala Glu Arg Ile Ile Glu Val Leu Trp Ala Pro Ser Pro Ser  
645 650 655

Ser Val Phe Leu Val Ala Ile Gln Val Glu Ala Leu Asp Arg His Arg  
660 665 670

Leu Leu Ser Asp Val Thr Arg Ala Leu Ala Asp Glu Lys Val Asn Ile  
675 680 685

Leu Ser Ala Ser Val Thr Thr Ser Gly Asp Arg Val Ala Ile Ser Arg  
690 695 700

Phe Thr Phe Glu Met Gly Asp Pro Lys His Leu Gly His Leu Leu Asn  
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Ala Val Arg Asn Val Glu Gly Val Tyr Asp Val Tyr Arg Val Thr Ser  
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<212> PRT  
<213> Mycobacterium tuberculosis

<400> 8

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Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
20 25 30

Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu  
85 90 95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu Pro Pro Glu Lys  
145 150 155 160

Gln Ala Arg Lys Ala Arg Glu Thr Leu Glu Val Ile Ala Pro Leu Ala  
165 170 175

His Arg Leu Gly Met Ala Ser Val Lys Trp Glu Leu Glu Asp Leu Ser

180

185

190

Phe Ala Ile Leu His Pro Lys Lys Tyr Glu Glu Ile Val Arg Leu Val  
195 200 205

Ala Gly Arg Ala Pro Ser Arg Asp Thr Tyr Leu Ala Lys Val Arg Ala  
210 215 220

Glu Ile Val Asn Thr Leu Thr Ala Ser Lys Ile Lys Ala Thr Val Glu  
225 230 235 240

Gly Arg Pro Lys His Tyr Trp Ser Ile Tyr Gln Lys Met Ile Val Lys  
245 250 255

Gly Arg Asp Phe Asp Asp Ile His Asp Leu Val Gly Val Arg Ile Leu  
260 265 270

Cys Asp Glu Ile Arg Asp Cys Tyr Ala Ala Val Gly Val Val His Ser  
275 280 285

Leu Trp Gln Pro Met Ala Gly Arg Phe Lys Asp Tyr Ile Ala Gln Pro  
290 295 300

Arg Tyr Gly Val Tyr Gln Ser Leu His Thr Thr Val Val Gly Pro Glu  
305 310 315 320

Gly Lys Pro Leu Glu Val Gln Ile Arg Thr Arg Asp Met His Arg Thr  
325 330 335

Ala Glu Tyr Gly Ile Ala Ala His Trp Arg Tyr Lys Glu Ala Lys Gly  
340 345 350

Arg Asn Gly Val Leu His Pro His Ala Ala Ala Glu Ile Asp Asp Met  
355 360 365

Ala Trp Met Arg Gln Leu Leu Asp Trp Gln Arg Glu Ala Ala Asp Pro  
370 375 380

Gly Glu Phe Leu Glu Ser Leu Arg Tyr Asp Leu Ala Val Gln Glu Ile  
385 390 395 400

Phe Val Phe Thr Pro Lys Gly Asp Val Ile Thr Leu Pro Thr Gly Ser  
405 410 415

Thr Pro Val Asp Phe Ala Tyr Ala Val His Thr Glu Val Gly His Arg  
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Cys Ile Gly Ala Arg Val Asn Gly Arg Leu Val Ala Leu Glu Arg Lys

435

440

445

Leu Glu  
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<210> 9  
<211> 394  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 9

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Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
20 25 30

Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu  
85 90 95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu Pro Pro Glu Lys  
145 150 155 160

Gln Ala Arg Lys Ala Arg Glu Thr Leu Glu Val Ile Ala Pro Leu Ala  
165 170 175

His Arg Leu Gly Met Ala Ser Val Lys Trp Glu Leu Glu Asp Leu Ser  
180 185 190

Phe Ala Ile Leu His Pro Lys Lys Tyr Glu Glu Ile Val Arg Leu Val  
195 200 205

Ala Gly Arg Ala Pro Ser Arg Asp Thr Tyr Leu Ala Lys Val Arg Ala  
 210 215 220

Glu Ile Val Asn Thr Leu Thr Ala Ser Lys Ile Lys Ala Thr Val Glu  
 225 230 235 240

Gly Arg Pro Lys His Tyr Trp Ser Ile Tyr Gln Lys Met Ile Val Lys  
 245 250 255

Gly Arg Asp Phe Asp Asp Ile His Asp Leu Val Gly Val Arg Ile Leu  
 260 265 270

Cys Asp Glu Ile Arg Asp Cys Tyr Ala Ala Val Gly Val Val His Ser  
 275 280 285

Leu Trp Gln Pro Met Ala Gly Arg Phe Lys Asp Tyr Ile Ala Gln Pro  
 290 295 300

Arg Tyr Gly Val Tyr Gln Ser Leu His Thr Thr Val Val Gly Pro Glu  
 305 310 315 320

Gly Lys Pro Leu Glu Val Gln Ile Arg Thr Arg Asp Met His Arg Thr  
 325 330 335

Ala Glu Tyr Gly Ile Ala Ala His Trp Arg Tyr Lys Glu Ala Lys Gly  
 340 345 350

Arg Asn Gly Val Leu His Pro His Ala Ala Ala Glu Ile Asp Asp Met  
 355 360 365

Ala Trp Met Arg Gln Leu Leu Asp Trp Gln Arg Glu Ala Ala Asp Pro  
 370 375 380

Gly Glu Phe Leu Glu Ser Leu Arg Tyr Asp  
 385 390

<210> 10

<211> 203

<212> PRT

<213> Mycobacterium tuberculosis

<400> 10

Met Thr Ala Gln Arg Ser Thr Thr Asn Pro Val Leu Glu Pro Leu Val  
 1 5 10 15

Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
 20 25 30



Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu  
85 90 95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu Pro Pro Glu Lys  
145 150 155 160

Gln Ala Arg Lys Ala Arg Glu Thr Leu Glu Val Ile Ala Pro Leu Ala  
165 170 175

His Arg Leu Gly Met Ala Ser Val Lys Trp Glu Leu Glu Asp Leu Ser  
180 185 190

Phe Ala Ile Leu His Pro Lys Lys Tyr Glu Glu  
195 200

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<211> 181  
<212> PRT  
<213> Mycobacterium tuberculosis

<400> 11

Met Thr Ala Gln Arg Ser Thr Thr Asn Pro Val Leu Glu Pro Leu Val  
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Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
20 25 30

Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu  
85 90 95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu Pro Pro Glu Lys  
145 150 155 160

Gln Ala Arg Lys Ala Arg Glu Thr Leu Glu Val Ile Ala Pro Leu Ala  
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His Arg Leu Gly Met  
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<210> 12

<211> 156

<212> PRT

<213> Mycobacterium tuberculosis

<400> 12

Met Thr Ala Gln Arg Ser Thr Thr Asn Pro Val Leu Glu Pro Leu Val  
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Ala Val His Arg Glu Ile Tyr Pro Lys Ala Asp Leu Ser Ile Leu Gln  
20 25 30

Arg Ala Tyr Glu Val Ala Asp Gln Arg His Ala Ser Gln Leu Arg Gln  
35 40 45

Ser Gly Asp Pro Tyr Ile Thr His Pro Leu Ala Val Ala Asn Ile Leu  
50 55 60

Ala Glu Leu Gly Met Asp Thr Thr Thr Leu Val Ala Ala Leu Leu His  
65 70 75 80

Asp Thr Val Glu Asp Thr Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu

85

90

95

Phe Gly Glu Glu Val Gly His Leu Val Asp Gly Val Thr Lys Leu Asp  
100 105 110

Arg Val Val Leu Gly Ser Ala Ala Glu Gly Glu Thr Ile Arg Lys Met  
115 120 125

Ile Thr Ala Met Ala Arg Asp Pro Arg Val Leu Val Ile Lys Val Ala  
130 135 140

Asp Arg Leu His Asn Met Arg Thr Met Arg Phe Leu  
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<210> 13

<211> 308

<212> PRT

<213> Mycobacterium tuberculosis

<400> 13

Gly Tyr Thr Leu Glu Ala Leu Thr Glu Glu Phe Gly Glu Glu Val Gly  
1 5 10 15

His Leu Val Asp Gly Val Thr Lys Leu Asp Arg Val Val Leu Gly Ser  
20 25 30

Ala Ala Glu Gly Glu Thr Ile Arg Lys Met Ile Thr Ala Met Ala Arg  
35 40 45

Asp Pro Arg Val Leu Val Ile Lys Val Ala Asp Arg Leu His Asn Met  
50 55 60

Arg Thr Met Arg Phe Leu Pro Pro Glu Lys Gln Ala Arg Lys Ala Arg  
65 70 75 80

Glu Thr Leu Glu Val Ile Ala Pro Leu Ala His Arg Leu Gly Met Ala  
85 90 95

Ser Val Lys Trp Glu Leu Glu Asp Leu Ser Phe Ala Ile Leu His Pro  
100 105 110

Lys Lys Tyr Glu Glu Ile Val Arg Leu Val Ala Gly Arg Ala Pro Ser  
115 120 125

Arg Asp Thr Tyr Leu Ala Lys Val Arg Ala Glu Ile Val Asn Thr Leu  
130 135 140

Thr Ala Ser Lys Ile Lys Ala Thr Val Glu Gly Arg Pro Lys His Tyr  
145 150 155 160

Trp Ser Ile Tyr Gln Lys Met Ile Val Lys Gly Arg Asp Phe Asp Asp  
165 170 175

Ile His Asp Leu Val Gly Val Arg Ile Leu Cys Asp Glu Ile Arg Asp  
180 185 190

Cys Tyr Ala Ala Val Gly Val Val His Ser Leu Trp Gln Pro Met Ala  
195 200 205

Gly Arg Phe Lys Asp Tyr Ile Ala Gln Pro Arg Tyr Gly Val Tyr Gln  
210 215 220

Ser Leu His Thr Thr Val Val Gly Pro Glu Gly Lys Pro Leu Glu Val  
225 230 235 240

Gln Ile Arg Thr Arg Asp Met His Arg Thr Ala Glu Tyr Gly Ile Ala  
245 250 255

Ala His Trp Arg Tyr Lys Glu Ala Lys Gly Arg Asn Gly Val Leu His  
260 265 270

Pro His Ala Ala Ala Glu Ile Asp Asp Met Ala Trp Met Arg Gln Leu  
275 280 285

Leu Asp Trp Gln Arg Glu Ala Ala Asp Pro Gly Glu Phe Leu Glu Ser  
290 295 300

Leu Arg Tyr Asp  
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<210> 14  
<211> 1350  
<212> DNA  
<213> Mycobacterium tuberculosis

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gacaccgtcg aggacaccgg ttacaccctg gaggcgttga ccgaggaatt cggcgaagag 300  
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gaaggcgaga ctattcgcaa gatgatcacc gcgatggccc gcgatccgcg ggtgctggtg 420  
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caggcccgca aggcccggtga gacgttggaa gtcattgcac ccctggcgca tcggctgggc 540  
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cggttggtag cgctggaacg caagctggaa 1350

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<211> 1182

<212> DNA

<213> Mycobacterium tuberculosis

<400> 15

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aggcatgcca gccagttgcg gcagtcgggt gatccctaca tcacccaccc gttggccggt 180  
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gccgccgcgg agatcgacga catggcctgg atgcgtcagc tgctcgactg gcaacgtgag 1140  
gcggccgacc ccggtgagtt cttggaatca ttgcgctacg ac 1182

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<211> 609  
<212> DNA  
<213> Mycobacterium tuberculosis

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aggcatgcca gccagttgcg gcagtcgggt gatccctaca tcaccacccc gttggccggt 180  
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gaaggcgaga ctattcgcaa gatgatcacc gcgatggccc gcgatccgcg ggtgctggtg 420  
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caggcccgca aggcccgta gacgttggaa gtcattgcac ccctggcgca tcggctgggc 540  
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tacgaggag 609

<210> 17  
<211> 543  
<212> DNA  
<213> Mycobacterium tuberculosis

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aggcatgcca gccagttgcg gcagtcgggt gatccctaca tcaccacccc gttggccggt 180  
gccaacattc tggccgagtt gggcatggac accaccactt tgggtggccgc gctgctgcac 240  
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gtggggccatc tcgtcgacgg ggtgaccaag ctggatcggg tgggtgttggg cagcgccgcc 360  
gaaggcgaga ctattcgcaa gatgatcacc gcgatggccc gcgatccgcg ggtgctggtg 420  
ataaagggtg ctgaccggtt acacaacatg cgcaccatgc gcttcttgcc gccggagaag 480

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atg 543

<210> 18  
<211> 468  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 18  
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aggcatgcca gccagttgcg gcagtccggt gatccctaca tcacccaccc gttggccggtt 180  
gccaacattc tggccgagtt gggcatggac accaccactt tgggtggccgc gctgctgcac 240  
gacaccgtcg aggacaccgg ttacaccctg gaggcgttga ccgaggaatt cggcgaagag 300  
gtggggccatc tcgtcgacgg ggtgaccaag ctggatcggg tgggtgttggg cagcgccgcc 360  
gaaggcgaga ctattcgaa gatgatcacc gcgatggccc gcgatccgcg ggtgctggtg 420  
ataaaggtgg ctgaccggtt acacaacatg cgcaccatgc gcttcttg 468

<210> 19  
<211> 924  
<212> DNA  
<213> Mycobacterium tuberculosis

<400> 19  
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aagatgatca ccgcgatggc ccgcgatccg cgggtgctgg tgataaaggt ggctgaccgg 180  
ttacacaaca tgcgccaccat gcgcttcttg ccgccggaga agcaggcccc caaggcccgt 240  
gagacgttgg aagtcattgc acccctggcg catcggctgg gcatggccag cgtcaagtgg 300  
gagttggagg acctgtcctt cgcgatcctg catcccaaga agtacgagga gatcgtccgg 360  
ctggtcgccg gtcgcgcgcc gtcccgggac acctacctgg ccaaggtgcg tgccgaaatc 420  
gtcaacacgc tgaccgcgtc gaagatcaag gcgacggtgg agggccgccc caagcactat 480  
tggtcgatct accagaagat gatcgttaag ggccgcgact tcgacgacat ccacgacctg 540  
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